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(71) Applicant(s)
Stephen Ashley Harper
Harper Classic Guns, Northridge Preston Road,
GAWCOTT, Buckingham, MK18 4HS, United Kingdom

(72) Inventor(s)
Stephen Ashley Harper

(74) Agent and/or Address for Service
Mathys & Squire
100 Grays Inn Road, LONDON, WC1X 8AL,
United Kingdom

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(56) Documents Cited

GB 1223675 A	GB 1095310 A	GB 0420781 A
WO 86/01679 A2	US 5388520 A	US 4362145 A

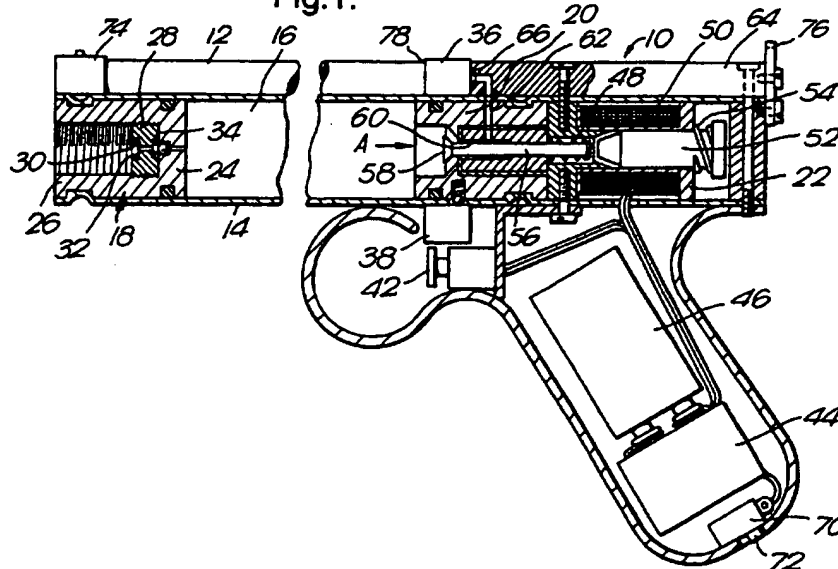
(58) Field of Search
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(54) Air gun

(57) This invention relates to an improved air gun. The air gun includes an electronic trigger switch 42 which causes the gun to fire. The trigger actuates a solenoid 50 which directly actuates a valve 58 allowing pressurised air to propel a pellet.

A rotary magazine 36 supports pellets prior to firing. The magazine includes a plurality of tubular members which successively form part of the barrel.

Fig.1.



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Fig.1.

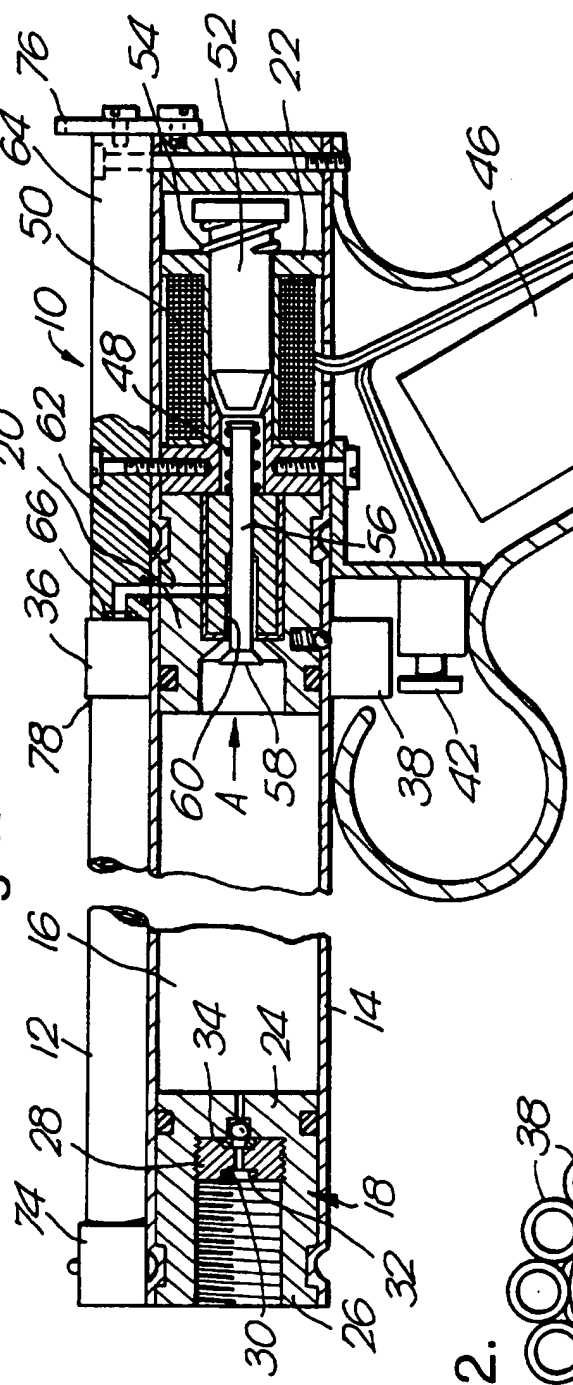


Fig.2.

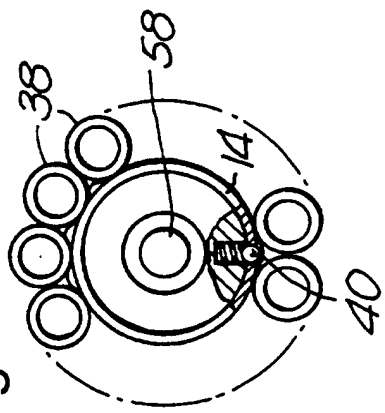


Fig.3.



Air Gun

This invention relates to improvements in air guns.

It is known to provide an air gun with an electronic switch. In these air guns the trigger is generally cocked manually and the gun is fired by depression (or the like) of the switch. The trigger is cocked manually as a considerable amount of energy is required to overcome the charged air pressure on the exhaust valves used in the mechanism. This amount of energy is usually more than is available from a battery powered solenoid.

In other air guns it is known to provide a rotary magazine for air pellets. These work on the basis of a conventional split shot dispenser and are mechanically complicated and somewhat cumbersome.

It is an object of the invention to provide an improved air gun which overcomes at least some of the above mentioned problems realised in air guns. According to one aspect of the present invention there is provided an air gun comprising:-

a barrel through which a pellet is fired, in use;

an electronic switch for causing the gun to be fired;

a pressurised air supply for propelling the pellet; and

valve means openable on action of the switch, by means of an electromechanical means, thereby allowing the pressurised air to propel the pellet through the barrel;

One of the advantages of this air gun is that the gun is fired by using the electromechanical means to move the valve directly.

According to a second aspect of the present invention there is provided an air gun comprising:-

a barrel through which a pellet is fired in use;
a trigger for causing the gun to be fired;
a manually movable magazine including a plurality of tubular members, each adapted to support a pellet; and means for propelling the pellet through the barrel; wherein the tubular members successively form part of the barrel.

One of the advantages of this air gun is that the magazine is a simple mechanical device which successively dispenses pellets.

Reference will now be made, by way of example, to the accompanying drawings, in which:-

FIGURE 1 is a partial corss-sectional view of an air gun according to the present invention;

FIGURE 2 is a section in the direction of arrow A in Figure 1; and

FIGURE 3 is a perspective view of a sighting clip used on the Figure 1 gun.

Referring to the drawings, an air gun is shown generally at (10). The gun comprises a cylindrical barrel (12) and a cylindrical chamber shown generally at (14). The cylindrical chamber has a larger diameter than the cylindrical barrel. The cylindrical chamber includes an air chamber (16); an inlet valve assembly (18) located at one end of the cylindrical chamber; an exhaust valve assembly (20) and a solenoid assembly (22). The inlet valve assembly has a solid insert (24) which includes an annular section (26). The annular section has a threaded section (28), into which a threaded valve (30) is mounted. The valve includes two O-rings (32,34) to form a seal between air

chamber (16) and the inlet valve assembly. In use the air chamber is pressurised using a pressurising air supply (not shown) through the inlet valve assembly.

The barrel includes a rotary magazine (36). The rotary magazine includes a plurality of typically ten hollow tubes (38) welded together to form a circular magazine, each tube having a bore slightly larger than the diameter of the barrel. The circular magazine is situated around the outer circumference of the cylindrical chamber, and forms a close fit therewith.

The tubes all lie around the outer circumference of the cylindrical chamber, with one magazine being aligned with the bore of the barrel. Referring particularly to Figure 2, a magazine location member 40 is used to ensure that the tube is correctly aligned with the barrel. The rotary magazine may be rotated manually in order to bring the tubes successively into alignment with the barrel bore. In use each tube holds a pellet (not shown), which forms a friction fit in the tube. Each tube may include means for holding the pellet, for example a first arcuate plate (not shown) located against the front of the magazine and attached to the cylindrical chamber and a second arcuate plate (not shown) located against the back of the magazine, and attached to the cylindrical chamber. The second plate means is at least partially pivotable to allow the magazine to be loaded. When a tube of the magazine is loaded and aligned with the barrel bore, the gun may be fired. The barrel may be rifled. The pellet makes a very tight fit in the barrel, to ensure that there is an air seal and the shooting operation is efficient.

An electronic, touch/sensitive trigger (42) in the form of a switch is electrically connected to an electronic circuit shown generally at (44). Powered by a battery (46) the electronic circuit (44) actuates the solenoid assembly (22) when the switch is activated. The solenoid assembly includes a coil of wire (50) surrounding an iron core (52). When the solenoid is actuated the exhaust valve assembly (20) is caused to open. The exhaust valve assembly includes a rod (56) and a seal (58). When the valve is closed, seal (58) is seated at the entrance of an air passage (60), and is held closed by the air pressure in the air chamber. When the valve is opened, the seal is pushed into the air chamber, thereby opening the air passage. A charge of high pressure air then passes into the air passage. The air passage is connected to a connecting bore (62) located in the breach block (64) of the gun and which allows the charge of air to pass through O-valve (66) and then to force a pellet down the barrel. The O-valve seals the rear face of the operative magazine tube against the breach block.

The electronic circuit then switches off the current flow to the solenoid and the exhaust valve closes, under the action of springs (48) and (54).

A safety switch (70) is connected to the electronic circuit and includes an external on off button (72). When the button is 'on' the gun can fire. When the button is 'off' the electronic circuit is inhibited from working.

A sight clip (74) is slidably mounted on the barrel so that it can be moved along the barrel to a predetermined location for aiming the gun. A second sight member (76) may be located at the butt end of the barrel.

It will be appreciated that the solenoid core may open the exhaust valve in different ways, for example, the core may magnetically repel the rod, or the core and rod may be intergral.

It should be noted that the number of tubes used to make up the magazine is not limited to ten as described but may be any number depending on the calibre of the pellet and the size of the air chamber.

Since the tubes of the magazine form part of the barrel it may be necessary to include an O-ring seal between the front of the tubes and the back (78) of the barrel. However, this seal is not essential as air loss in front of the pellet is not of significant bearing.

The term pellet as used in this specification is intended to include all projectiles which may be fired from a gun.

The magazine may include a number of tubes linearly arranged to be moved backwards and forwards along its length so that each tube may be aligned with the barrel.

It will be appreciated by those skilled in the art that the solenoid assembly may be replaced by an alternative electromechanical device, for example a piezoelectric crystal assembly.

Claims

1. An air gun comprising:-

a barrel through which a pellet is fired, in use;
an electronic switch for causing the gun to be fired;
a pressurised air supply for propelling the pellet; and
valve means openable on action of the switch, by means of an
electromechanical means, thereby allowing the pressurised air to
propel the pellet through the barrel;

2. An air gun according to claim 1, wherein the electromechanical
means includes a solenoid assembly.

3. An air gun according to claim 2, wherein the valve means
comprises a valve member held in sealing engagement by the pressure of
air in said supply and wherein the solenoid assembly acts directly
upon the valve member to move the seal out of sealing engagement.

4. An air gun according to claim 1, wherein the electromechanical
means includes a piezoelectric crystal assembly.

5. An air gun comprising:-

a barrel through which a pellet is fired in use;
a trigger for causing the gun to be fired;
a manually movable magazine including a plurality of tubular

members, each adapted to support a pellet; and

means for propelling the pellet through the barrel;

wherein the tubular members successively form part of the barrel.

6. An air gun according to claim 5, wherein the magazine is circular.

7. An air gun according to claim 6, wherein the magazine is rotatable about an axis generally parallel with the length of the barrel, to cause the tubular members to successively form part of the barrel.

8. An air gun according to claim 7, wherein the tubular members are interconnected to form an annulus which encircles and is rotatable with respect to said air supply.

9. An air gun substantially as described with reference to and as shown in the accompanying drawings.



The Patent Office



Application No: GB 9611183.6
Claims searched: 1 to 4

Examiner: Trevor Berry
Date of search: 4 June 1997

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.O): F3C (CFJ)
Int CI (Ed.6): F41B
Other: ONLINE: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1223675 ETHER ENG.-see actuator 25, figure 3.	1, 2
X	GB 1095310 FIAT-see actuator 13, figure 3.	1, 2
X	GB 0420781 AIGNER-see motor 23.	1
X	WO 86/01679 A2 EDELMAN-see valve 32, figure 1.	1, 2
X	US 5388520 HAMMOND-see solenoid valve, figure 5.	1, 2
X	US 4362145 STELCHEER-see actuator 64, figure 2.	1, 2

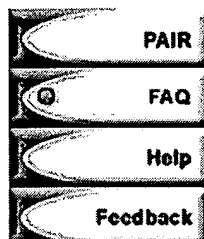
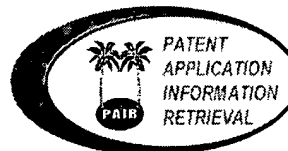
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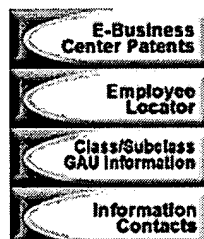
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Application Number:	07/944,132	Customer Number:	-
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Application Type:	Utility	Status Date:	09-29-1993
Examiner Name:	LAVIOLA JR, FRANK	Location:	FILE REPOSITO (FRANCONIA)
Group Art Unit:	3303	Location Date:	03-21-1995
Confirmation Number:	7716	Earliest Publication No:	-
Attorney Docket Number:	TOP-102-U.S.	Earliest Publication Date:	-
Class/ Sub-Class:	132/281	Patent Number:	5,251,650
First Named Inventor:	TOMIMA L. EDMARK, DALLAS, TX (US)	Issue Date of Patent:	10-12-1993
Title Of Invention:	HAIR PIN FOR A HAIR STYLING TOOL		

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File History		
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18	05-27-1993	Claim Preliminary Amendment
17	05-27-1993	Drawing Preliminary Amendment
15	09-07-1993	Issue Notification Mailed
14	09-07-1993	Issue Notification Mailed
13	07-19-1993	Mailroom Date of Issue Fee Payment
12	07-19-1993	Supplemental Papers - Oath or Declaration
11	06-30-1993	Communication - Re: Power of Attorney (PTOL-308)
10	05-27-1993	Change in Power of Attorney (May Include Associate POA)
9	05-07-1993	Mail Notice of Allowance
8	05-07-1993	Notice of Allowance Data Verification Completed

7	05-07-1993	Notice of Allowability
6	05-06-1993	Date Forwarded to Examiner
5	04-12-1993	Response after Non-Final Action
4	01-07-1993	Mail Non-Final Rejection
3	12-07-1992	Non-Final Rejection
2	10-09-1992	Case Docketed to Examiner in GAU
1	09-30-1992	Application Captured on Microfilm

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